

We claim:

1. A power delivery management system, the system comprising:

5 a plurality of digital power management devices, wherein each of the plurality of power management devices comprises a plurality of functions, wherein each of the plurality of power management devices is operable to provide power to one or more point of load devices; and

a control and communication bus, wherein each one of the plurality of digital power management devices is coupled to the control and communication bus;

10 wherein each respective one of the plurality of digital power management devices includes a controller operable to control the functions of the respective digital power management device; and

wherein the plurality of digital power management devices exchange information over the control and communication bus to coordinate their functions.

15 2. The system of claim 1,

wherein at least one of the plurality of digital power management devices is also operable to coordinate the functions of one or more other ones of the plurality of digital power management devices.

20 3. The system of claim 2,

wherein the other ones of the plurality of digital power management devices provide status information over the control and communication bus to the at least one of the plurality of digital power management devices.

25 4. The system of claim 1,

wherein the plurality of functions comprise one or more power delivery functions; wherein each respective one of the plurality of digital power management devices includes a controller operable to control the one or more power delivery functions of the respective digital power management device.

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5. The system of claim 1,
wherein at least a subset of the plurality of digital power management devices
each comprise the same functions.

5 6. The system of claim 1, wherein one or more of the plurality of digital
power management devices comprises a voltage converter unit.

7. The system of claim 6, wherein the voltage converter unit comprises a DC
(direct current) to DC voltage converter.

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8. The system of claim 1, wherein the control and communication bus is a
digital bus.

9. The system of claim 8, wherein the control and communication bus
15 comprises at least one of:

error detection capability; and

a training sequence to allow quick clock recovery.

10. The system of claim 8, wherein the control and communication bus is
20 configured to allow bus transitions to be used to perform clock synchronization between
devices coupled to the control and communication bus.

11. The system of claim 8, wherein the control and communication bus
comprises one or more digital communication paths, wherein each one of the one or more
25 digital communication paths comprises one or more dedicated signals.

12. The system of claim 11, wherein the one or more digital communication
paths are operable to be modulated onto an input supply voltage that provides voltage to
the system.

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13. The system of claim 1, wherein each individual one of the plurality of digital power management devices is operable to be programmed and/or configured across the control and communication bus.

5 14. The system of claim 1, wherein two or more of the plurality of digital power management devices are operable to be grouped together in a current sharing configuration.

10 15. The system of claim 14, wherein the two or more of the plurality of digital power management devices grouped in the current sharing configuration are operable to automatically reconfigure themselves in response to a failure of one or more of the two or more of the plurality of digital power management devices grouped in the current sharing configuration.

15 16. The system of claim 14, wherein one of the two or more of the plurality of digital power management devices grouped in the current sharing configuration is operable to be automatically identified as a master device for the current sharing configuration.

20 17. The system of claim 16, wherein the master device is operable to automatically reconfigure the current sharing configuration in response to a failure of one or more of the two or more of the plurality of digital power management devices grouped in the current sharing configuration.

25 18. The system of claim 16, wherein in support of the current-sharing configuration the master device is operable to automatically transmit one or more of:

a respective measured load current;
a respective measured load voltage; and
respective measured status data.

19. The system of claim 16, wherein in support of the current-sharing configuration the master device is operable to limit and/or control one or more of:

output load current;
output load voltage; and
output load temperature.

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20. The system of claim 1, wherein each one of the plurality of digital power management devices is operable to provide feedback data to all other ones of the plurality of digital power management devices.

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21. The system of claim 20, wherein the feedback data comprises real-time data.

22. The system of claim 1, wherein the functions of the plurality of digital power management devices comprise at least one of:

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supply sequencing;
phase offset adjustment;
current sharing;
voltage programming and voltage tracking; and
ramp rate control.

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23. The system of claim 22, wherein each one of the plurality of digital power management devices is operable to automatically transmit a respective measured or target voltage value on the control and communication bus to support the voltage tracking.

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24. The system of claim 22, wherein each one of the plurality of digital power management devices is operable to automatically transmit one or more respective output voltage values on the control and communication bus to support the voltage tracking.

25. The system of claim 1, wherein the functional features of the plurality of digital power management devices include margining.

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26. The system of claim 1, wherein the functional features of the plurality of digital power management devices include voltage supply sequencing.

5 27. The system of claim 1 further comprising at least one master control device coupled to the control and communication bus, wherein the at least one master control device is operable to centrally control the plurality of digital power management devices to implement advanced features.

10 28. The system of claim 27, wherein the advanced features comprise reconfiguring and/or reprogramming one or more of the plurality of digital power management devices.

15 29. The system of claim 27, wherein the advanced features comprise one or more of:

fault prediction;
air-flow control; and
advanced voltage supply sequencing.

20 30. The system of claim 1, wherein each one of the plurality of digital power management devices is operable to automatically self-test.

31. The system of claim 1, wherein each one of the plurality of digital power management devices is operable to auto-calibrate.

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32. The system of claim 1,
wherein the power delivery management system is comprised on a printed circuit board;

30 wherein each of the plurality of digital power management devices is distributed on the printed circuit board.

33. The system of claim 1,
wherein each of the plurality of digital power management devices comprises an integrated circuit.

5 34. The system of claim 1, wherein the control and communication bus is a serial bus.

10 35. A power delivery management system, the system comprising:
a plurality of voltage converter units, wherein each of the plurality of voltage converter units is operable to provide power to one or more point of load devices;
a digital control and communication bus, wherein each one of the plurality of voltage converter units is coupled to the digital control and communication bus; and
a master control device coupled to the digital control and communication bus;
15 wherein the master control device is operable to control the plurality of voltage converter units through communicating with the plurality of voltage converter units over the digital control and communication bus.

20 36. The system of claim 35, wherein the digital control and communication bus is a serial digital control and communication bus.

25 37. The system of claim 35, wherein said communicating with the plurality of voltage converter units comprises each one of the plurality of voltage converter units providing feedback data to the master control device.

38. The system of claim 35, wherein the master control device comprises a controller operable to execute functions corresponding to each of the plurality of voltage converter units to control the plurality of voltage controller units.

39. The system of claim 35, wherein the plurality of voltage converter units provide status information over the digital control and communication bus to the master control device.